

Veggie D/E/F Molecular Abstract

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Title: Plant microbiomes may provide vital information to plant success.

Plant associated microbiomes, the rhizosphere and phyllosphere, are composed of communities of bacteria and fungi that may be mutualistic or pathogenic. These communities have the potential to influence plant health and development and can affect plant growth. Crop plants are being investigated as a fresh and safe supplement to astronauts' diet and it is critical to understand and characterize these microbial communities. Multi-species crops, Mizuna mustard (*Brassica rapa* var japonica), 'Outredgeous' red romaine lettuce (*Lactuca sativa*), and Waldman's Green lettuce (*Lactuca sativa*) were grown in two Veggie units on the International Space Station (ISS) for three grow outs in various combinations of plant types. Upon harvest, plant and pillow samples were frozen and returned to Earth for analysis. Bacterial and fungal community analyses for plant leaf and root, as well as pillow components, wick and media, were completed using next generation sequencing with the goal of surveying the composition of the entire community and identifying any potential pathogens. Bacteria were identified using the 16S rRNA gene whereas, fungi were identified with the internal transcribed spacer (ITS). The community composition for these three crops was compared between crop types and between plant tissue types. It is vital to mission success for the short term and long term to add nutritious, safe to eat vegetables providing a supplement to the crew members' dietary requirements as well as to develop planning for deep space missions as we reach for the moon and on to Mars. Veggie technology validation tests were supported by NASA's Space Biology Program.